Report on WS25CCC Workshop "25 Years of Combining Compositionality and Concurrency"

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In the peak of the summer 2013, between the 7th and the 9th of August, the workshop “25 Years of Combining Compositionality and Concurrency” took place in Königswinter, a picturesque little town overlooking the Rhine river, in the outskirts of Bonn. The event, organised by Ursula Goltz, Rob van Glabbeek and Ernst-Rüdiger Olderog, was meant to celebrate and revisit, a quarter of a century later, the workshop “Combining Compositionality and Concurrency" (CCC88) that had been held in March 1988 in the same hotel, the Loreley, on the initiative of the same trio of researchers (the first two of which were still PhD students at the time). Both workshops were by invitation only, and each attracted 34 participants.

Because of its timely character and its deliberate focus on bridging the gap between process calculi and “true-concurrency” models, the original CCC88 workshop, targeting a group of active researchers from both fields, had generated much enthusiasm and discussion. It had therefore gradually acquired, at least in the memories of its participants, the mythical status of a “foundational event”. It was then quite natural for the organisers, 25 years later, to envisage a kind of jubilee event, which could bring together a number of participants from the original workshop, as well as younger researchers who had joined in more recent years the field of concurrency theory, now much broader and well-established.

It was by no Loreley deed[1], but rather by a strong “community feeling”, that at least one third of the original participants responded positively to the invitation to the new event. This was certainly a high response rate for the season, considering that August is a “sacred” vacation month in most Southern European countries.

Some important differences could be noticed between the two meetings, concerning the origin of participants and the scientific spectrum that was covered. While the 1988 workshop enjoyed a well-balanced European participation, including Eastern European countries such as Poland, and featured a limited but lively participation from non-European states such as Israel and California, the 2013 edition was more polarised towards Northern Europe (probably due to the “off-season” effect mentioned above), and its non-European participation fell down to a single person (Rob van Glabbeek), reaching as far as Australia.

On the thematic side, while the 1988 workshop adopted a “fan-in” approach, inviting participants to concentrate on a specific topic, the 2013 workshop took

[1] “Das hat mit ihrem Singen die Lorelei getan”: this was the closing of Heine’s poem, recounting the spell that the legendary Rhine maiden Lorelei cast on shipmen with her singing.

a “fan-out” approach, leaving the speakers entirely free to choose the subject of their talk. The intention of the organisers was probably to see what concurrency people were up to, 25 years after the exciting discussions of the original meeting.

More specifically, the 1988 workshop marked the convergence of the different communities of process calculi, automata theory, event structures and Petri nets. This workshop was mostly of a theoretical nature and put a strong emphasis on “true-concurrency" semantics, as opposed to the “interleaving semantics” prevailing in the process algebra community at the time. This was witnessed by numerous talks on partial order semantics for process calculi, concurrency and causality-preserving equivalence relations for processes, and interpretations of process calculi into semantic models such as event structures and Petri nets. To cite only one, let us mention the interpretation of a recursive subset of CCS into finite P/T nets given by Ulla Goltz. There were also several presentations on CCSP, a process calculus combining operators from CCS and CSP, promoted by Ernst-Rüdiger Olderog. To put some order into the growing forest of equivalence relations, Rob van Glabbeek proposed a systematic classification of them into what was to become his “linear time–branching time spectrum” of semantic equivalences. The workshop also showed the emergence of action refinement as a new criterion to assess equivalence relations, a subject that was to be thoroughly studied in subsequent years. A new equivalence that was preserved by refinement and was to play an important role in the sequel (behaviour-structure-equivalence, later renamed history-preserving bisimulation) was presented there for the first time, by Yoram Hirshfeld, Alexander Rabinovich and Boris Trakhtenbrot. Another important issue, put forward by Robin Milner and admittedly formulated within a “false-concurrency" CCS model, was that of the unique decomposition of processes into prime factors. This classical but nontrivial problem was to give rise to a new line of research, which is still active today.

By contrast, the 2013 workshop revealed a multitude of research directions, with a general trend towards developing verification tools and putting ideas into practice. It also showed that in the past two decades the once competing approaches of “true” and “false” concurrency had somehow evolved towards a state of peaceful coexistence. Theory and practice were well-mingled in the range of talks. On the one hand, one could notice the persistence of fundamental studies on the notions of causality, compositionality and distributability (as witnessed by the joint talk by Ulla Goltz, Rob van Glabbeek and Jens Schicke-Uffmann, and by the talk by Kirstin Peters), on the synthesis of distributed systems (talks by Eike Best and by Bernd Finkbeiner), and on the relation between concurrent computation models and more classical models such as Turing machines (talks by Jos Baeten and by Markus Müller-Olm). On a similar vein, a few talks dealt with interface automata and timed or reconfigurable automata networks, with a concern for verification (talks by Gerald Lüttgen and Walter Vogler, by Ernst-Rüdiger Olderog

and by Nicoletta Sabadini). On the other hand, the presentations showed the increasing importance of probabilistic and quantitative approaches (talk by Christian Eisentraut); the emergence of new issues such as resource-aware computing and implicit complexity (talk by Roberto Amadio, based on concurrent extensions of the λ-calculus), reversibility (talk by Iain Phillips on reversible event structures) and security (talk by Sibylle Fröschle, stressing the pertinence of causality-based models to deal with the security of cyberphysical systems, and by Ilaria Castellani, presenting a semantic basis for noninterference properties in synchronous reactive languages); and the sustained popularity of topics such as language encodings (talk by Kirstin Peters).

The workshop also expressed a strong concern for the application of ideas from concurrency theory to real systems (talk by Roland Meyer on relaxed memory models) and for its adaptation to the new computational environments that are available today, such as web programming and peer-to-peer computing (talk by Matthew Hennessy on testing theories for web servers and peer networks). Furthermore, it showed the enormous progress and variety of verification tools based on concurrency theory, which were just about to start at the time of the first workshop in 1988, and the wide penetration of concurrency research into industry (talks by Hubert Garavel, by Mohammad Reza Mousavi and by Frits Vaandrager, focus on automotive applications in the talks by Sibylle Fröschle and by Ulla Goltz).

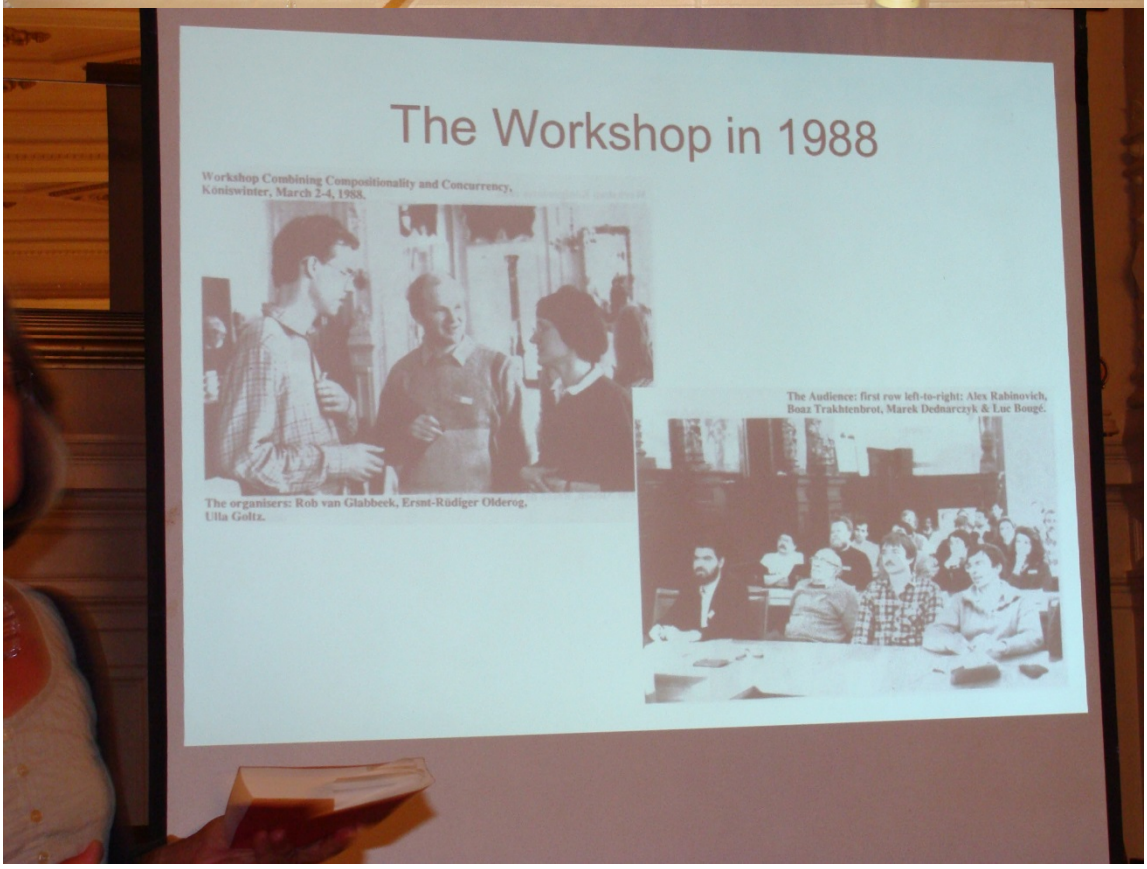
Finally, Holger Hermanns made a convincing case for using GoogleGo (the open source language developed by Google, officially based on CSP but deeply inspired by CCS) to “teach concurrent programming from the start”, without first introducing sequential programming.

On the social side, the ideal location of the Loreley hotel as well as the long days and the warmth of the season provided the added pleasure of sunlit meals on the veranda overlooking the Rhine, and evening walks on the river banks. The sun-dappled water of August versus the cold winds of March: this was certainly a good point in favour of the 2013 edition!

A collection of abstracts and slides of the talks, as well as the full list of participants, may be found on the web site of the workshop:

https://www.tu-braunschweig.de/ips/research/events/ws25ccc.


25 Years of
Combining Compositionality and Concurrency


The Workshop in 1988
Workshop Combining Compositionality and Concurrency,
Königswinter, March 2-4, 1988.
The organisers: Rob van Glabbeek, Ernst-Rüdiger Olderog,
Ulla Goltz.
The Audience: first row left-to-right: Alex Rabinovich,
Boaz Trakhtenbrot, Marek Dednarczyk & Luc Bougé.